

MEMORANDUM:

THESIS PROPOSAL:

A HISTORICAL STUDY OF CHANGING DEATH PATTERNS IN THE ORKNEY ISLANDS,

A NON-INDUSTRIAL SOCIETY BY

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OBJECTIVE

The objective of the research proposed here is an examination of the changes, continuities and internal contrasts in the mortality patterns of the populations of an isolated group of small north European islands, and their implications for human biology. The establishment of these patterns would provide a base for the development of studies of adaptation, human ecology, or microevolution.

LG 2022373

EXPECTED COSTS

1.	Completion of Key punching	\$1,000.00
2.	Computer Analyses (Based on use of lowest available priority to minimize costs.)	
	a. listings (for data clean-up and preliminary examination.)	30.00
	b. logical analyses for data clean-up	200.00
	c. cross tabulations	70.00
	d. data analysis and testing	<u>1,200.00</u>
	TOTAL	\$2,500.00

SIGNIFICANCE

The study proposed here presents a method for examining historical data on mortality by age and cause for a group of small populations. The use of observed distributions preserves the reality of individual variation. Consideration of causes of death as proportions of all deaths in a given time period allows the comparison of parishes without the calculation of rates which are unstable when based on small numbers.

The utility of the mode as a measure of central tendency is seen. The exclusive use of the median produces a distorted idea of how long most people live.

This study would provide data on microecological differences and their possible stability. Such data would provide a base from which studies could be designed to test hypotheses concerning micro-evolution and human adaptation. This study may establish differences, the nature and significance of which can then be explored.

RATIONALE

Death is an important factor in the theory of the demographic transition (Revelle 1968) as well as in the genetical theory of evolution (Haldane 1924, 1932, Fisher 1930, Wright 1931). There are very few long term studies of deaths in a population, although deaths prior to the completion of reproduction are one factor in natural selection. Few, if any, studies have attempted to consider who died, and at what age, and of what, over a time span that covers several generations.

The present expansion of the populations of the work due to changes in life expectancy is an important contemporary biocultural problem. Ecologists and gerontologists have suggested that senescence and life expectancy may be influenced by genetic factors, and may be evolved properties of populations (Medawar 1952, 1955, Comfort 1954, 1956, Williams 1957, Hamilton 1966, Emlen 1970). Pearl and Pearl long ago showed an inherited component in longevity (1934). Inherited components in major diseases of senescence including cardiovascular and cerebrovascular diseases are known (Thomas & Rose 1963, 1968). The decreases in mortality rates involved in the demographic transition originated in Scandinavia (Newell 1972 after Durand unpublished). Should there be genetic components in this phenomenon, it would be of considerable significance for world population problems. Ayala (1968) has verified the inter-relationship of genotype, environment and population numbers in free-living drosophila. Recently Anderson and King (1970) presented a simulation of age-specific selection which showed significant effects, and discussed the relevance of growth patterns of populations in different environments to different adaptive strategies and selective regimes.

In the study proposed here, mortality curves are to be examined in order to consider the possibility of the reality of variation in the populations of a group of small islands with relatively similar populations. Demographers generally consider variation in small populations to be sampling error (Hauser &

Duncan 1959, Petersen 1961, Howell 1973). Howell states that "There is a long tradition in empirical demography of finding that in country after country, the amount of variation from central tendencies decreases along with improvements in the quality of data and analysis. In other words, deviations have often come from bad reporting rather than from the population itself....," (Howell 1973 p. 251). Variation from central tendency may, however, be a matter of scale, and not bad reporting (Brass 1972 b).

There are two sorts of factors of small scale that may be involved: statistical problems of the variability of small samples; and adaptation to micro-environmental variation. The first of these Howell considers; the second, which may be genetic or developmental, and thus a cause of heterogeneity, she does not. Roberts (1965) has drawn attention to variations in gene frequency over small geographic distances. Berry has argued that these are compatible with a selective origin but not with any form of sampling error, since they persist (Berry 1967, 1968, 1971).

Darling (1955) and Darling and Boyd (1964) have discussed the role of microenvironmental variation in ecosystems based on observations of the Highlands and Western Islands of Scotland. They show that variations in microenvironmental factors such as trace element concentrations, soil and water ph, temperature average and range, and amount of evaporation, can have profound influences on ecosystems. Small changes in ph of a stream due to variation in the underlying geologic strata can alter the entire complex of plants and animals dependent on that stream including domesticates. Darling and Boyd discuss the influence of the presence or absence of shell sand on the agriculture of the Western Isles. Shell sand can be used to neutralize acid soil so that it will support agriculture and not be fit only for pasture or peat bog.

Interactions between physicochemical environment and domestic animals are well known (Voison 1959, Underwood 1971) and direct influences are known in humans as well, for example with respect to iodine and flourine. It is usually supposed that modern transport renders variations in dietary intake irrelevant to either health or selection, but that is questionable in western populations and hardly applies to most populations of anthropological interest.

Associations of characteristics of the geochemical environment with patterns of disease incidence and with mortality rates from chronic diseases have been observed (Howe 1963, Morris et al. 1962 et seq., Schroeder 1966, Takahasi 1967, Berry 1969, Hoops & Cannon 1972, Hickey et al. 1970 a & b). Since micro-environmental differences can produce quite different floral and faunal complexes in adjacent areas and since there are associations between human disease patterns and factors in the geochemical environment, and since host factors are known in some of the same diseases that show geographic variation, it seems unwise to rule out causal relationships in local variations in human biology without serious consideration. Berry (1969) has proposed a hypothesis of the origin of multiple sclerosis which considers both host factors and geochemical environment. The multiple sclerosis rate in Orkney is one of the world's highest (Howe 1963).

While Orkney can hardly be considered primitive, the islands are relatively stable, fairly isolated, unindustrialized and non-urban, and of similar size to other populations considered by anthropologists, although they do have good modern medical care. If demographic assumptions of the non-significance of variation are contradicted in Orkney, they could hardly be expected to apply to populations more remote in space, time or culture from the industrialized urban populations usually studied by demographers.

An examination of the mortality curves for Orkney parishes over time can be expected to shed light on the possible existence of significant biological variation on a fine scale. The Geological Survey shows microenvironmental differences between Orkney parishes (Wilson et al. 1935). Moreover, Boyce, Brothwell and Holdsworth (1973) have shown differences in frequencies of hair color and ABO blood groups between parish populations. In general, if there is significant heterogeneity in either environment of human physiology, statistical methods based on enumeration of supposedly uniform entities cannot be validly applied to people.

DATA

I. The Orkney data I am analyzing consists of mortality registrations from six localities in the islands. These are Birsay, Deerness, Hoy, Kirkwall, Sanday, and S. Ronaldsay and Burray. A register entry consists of the following data:

1. surname and given name(s)
2. occupation and rank
3. name(s) of spouse(s), if any
4. marital status
5. date of death
6. place of death, and usual residence if death occurred elsewhere
7. sex
8. age at death
9. father's name
10. mother's name, including birth name
11. cause of death
12. name of certifying physician

II. Foremat:

1-5 blank
6 card # : 1
7-8 parish #
00 unknown
01-33 named Orkney parishes
99 outside Orkney
9-22 surname
23-31 first name
32 marital status
0 unknown
1 married
2 single
3 widowed
4 divorced
33,34 day of death
35,36 month of death
37-39 year of death: 850-971
40 blank
41-50 first name of father
51-63 birth surname of mother
64-72 first name of mother
73 sex: 1 ♂, 2 ♀
74,75 age at death: 00-99
blank: unknown
00: under one year
99: age 99 and above
76-78 cause of death according to the 2nd revision
of the International List (US, PHS, 1913)
79 physician's certification
0 not certified
1 certified

Preparation of this data for computer analysis consists of several steps.

1. data acquisition
2. coding of cause of death according to the International Statistical Classification
3. transcribing data on to Fortran forms
4. key punching
5. checking
6. correcting
7. data cleanup

IV. States of preparation of the data from the different parishes

a. Birsay

1. Entries from 2138 deaths occurring between 1855 and 1971 were transcribed into two notebooks during the summer of 1973.
2. This data has been coded, transcribed, punched, checked and corrected.

b. Deerness

1. Data on 709 mortalities occurring between 1855 and 1965 were photocopied by D.R. Brothwell. I received a micro-film copy of this data in the spring of 1979 from A.J. Boyce.
2. Is being coded for cause of death & transferred to Fortran coding sheets.

c. Hoy

1. Data transcribed by D.R. Brothwell. Transcriptions xeroxed by me in summer 1977.
2. Is being coded & transferred to Fortran coding sheets.

d. Kirkwall

1. Data from 1855 to 1972 transcribed into 11 notebooks by me during the summer of 1974. I estimate that this is about 10,000 entries.
2. ISC coding is complete
3. A 1/5th sample has been drawn.
4. This plus all entries from outside Kirkwall have been transcribed, and punched.
5. Checking and correction have not been carried out.

e. Sanday

1. Entries for 2178 mortalities occurring 1860-1965 photo-copied by A.J. Boyce. Photos machine copied by myself during the summer of 1974.
2. This data has been coded, transcribed, punched, checked and corrected.
3. A 1/5 sample of this data has been drawn and transcribed onto a notebook so that it can be redone as a check.

f. South Ronaldsay and Burray (one registration district)

1. Data on 4113 deaths occurring 1855-1971 transcribed into 5 notebooks, summer 1973.
2. ISC coding completed
3. transferred to Fortran forms
4. key punching in progress.